We claim:

1. A vacuum manifold for use in removing liquid from microarray spotting members, comprising:

- a plate defining a plurality of fluid flow channel members formed through the plate, each channel member defining an inlet and an outlet in fluid communication; and

- structure for coupling the plate to communicate with a source of vacuum to draw fluid from the microarray spotting members through the fluid flow channel members.

2. The vacuum manifold of claim 1, wherein the channel members are arranged in parallel rows.

3. The vacuum manifold of claim 1 or 2, wherein the spotting members comprise pins.

4. The vacuum manifold of claim 3, wherein the pins comprise Telechem Chipmaker 2 pins, Telechem Chipmaker 3 pins, or a combination thereof.

5. The vacuum manifold of any of claims 1 to 4, comprising 48 fluid flow channel members capable of simultaneously removing liquid from 48 spotting members.

6. The vacuum manifold of any of claims 1 to 5, wherein the vacuum manifold is capable of removing liquid from the spotting members so that there is about a 3-5% carryover of fluid on the spotting members.

7. The vacuum manifold of any of claims 1 to 6, wherein the diameter of the inlet is less than the spotting member diameter, and the spotting member includes a first tapered open end, a portion of the first tapered open end capable of extending into the inlet.

8. A method of removing liquid from a plurality of microarray spotting members, comprising applying a source of vacuum to the manifold of claim 1 and reciprocating the microarray spotting members proximate to the inlets of the manifold of claim 1 to create air turbulence between the spotting members and the inlets.

9. The method of claim 8, wherein the each microarray spotting member is concentric with the inlet during reciprocation.

10. The method of claim 9, wherein the spotting members are about 100 micrometers away from the inlet prior to reciprocation.

11. The method of any of claims 8 to 10, wherein the spotting members are reciprocated about a distance of 1 mm;

12. The method of any of claims 8 to 11, wherein each spotting member includes a first tapered open end having a portion capable of extending into the inlet, the first tapered open end portion received in the inlet during reciprocation;

13. The method of any of claims 8 to 11, wherein the first tapered open end portion reciprocates in and out of the inlet.

14. The method of any of claims 8 to 11, wherein the spotting member is spaced apart from the inlet during reciprocation.

15. The method of claim 1, wherein the vacuum is created by a compressed air system providing a pressure of 50 to 90 psi.

16. The method of claim 1, wherein the vacuum is created by a compressed air system providing a pressure of 60 psi.

17. A microarrayer comprising the vacuum manifold of any of claims 1 to 7.

18. A support device for holding microarray substrates in place during microarrayer operation, comprising

- a flat platform on which substrates may be placed, the flat platform including an array surface including first, second, third and fourth peripheral edges;

- a first bar on the first peripheral edge;

- a second bar on the second peripheral edge, the second bar perpendicular to the first bar;

- a third bar on the third peripheral edge, the third bar perpendicular to the second bar and opposed to the first bar, the third bar capable of applying force to the substrates to hold them in place during microarray operation;

- a plurality of end bars perpendicular to the first and third bars and opposed to the second bar, the end bars capable of being located on the third peripheral edge or on the array surface spaced apart from the third peripheral edge, the end bars capable of applying force to the substrates to hold them in place during microarray operation.

19. The support device of claim 18, wherein the device may be loaded with substrates for microarray operation by placing the each substrate on the flat platform and sliding it into a position suitable for microarrayer operation.

20. The support device of claim 18 or 19, wherein the end bars and second bars are moved proximate to the substrates so that the end bars and second bars apply force to the substrates to hold them in place during microarray operation.

21. The support device of any of claims 18 to 20, wherein the substrate comprises a slide.

22. The support device of any of claims 18 to 20, wherein the substrate is about the same length as an end bar.

23. The support device of claim 22, wherein the substrate and end bar have a length selected from the group consisting of 1 x 3 inch, 1 x 1 inch, and 2 x 3 inch.

24. The support device of any of claims 18 to 23, wherein the flat platform comprises a magnetic material and the end bars comprise magnets capable of releasable connection to the flat platform.

25. The support device of claim 24, wherein the magnetic material comprises steel.

26. The support device of any of claims 18 to 25, wherein the flat platform is rectangular and includes less than 200 micrometre variation between corners.

27. The support device of any of claims 18 to 26, wherein the flat platform is about 50 cm in length x 50 cm in width.

28. The support device of claim 1, wherein the flat platform is impermeable to air.

29. A microarrayer comprising the device of any of claims 18 to 28.

30. A blotting device for blotting liquid from the exterior of microarray spotting members, comprising:

- a blotting surface for drawing liquid from the microarray spotting members when the microarray spotting members contact the blotting surface;
- structure for contacting the microarray spotting members with the blotting surface.

31. The blotting device of claim 30, wherein the blotting surface comprises glass.

32. The blotting device of claim 30, wherein the blotting surface comprises a fixed glass slide.

33. The blotting device of any of claims 30 to 32, wherein the spotting members comprise pins.

34. The blotting device of claim 33, wherein the pins comprise Telechem Chipmaker 2 pins or Telechem Chipmaker 3 pins, or a combination thereof.

35. The blotting device of any of claims 30 to 34, wherein following blotting, the blotting surface is substantially free of liquid from the interior of the microarray spotting members.

36. The blotting device of any of claims 30 to 35, further comprising processing system for directing the microarray spotting members to make more than one contact with the blotting surface in a predetermined pattern so that no portion of the blotting surface is contacted by more than one microarray spotting member.

37. A microarrayer comprising the blotting system of any of claims 30 to 36.

38. A method of delivering liquid from a spotting member onto a microarray substrate for a microarray operation, comprising:

- advancing the spotting member from a first position to a second position, the spotting member spaced apart from the substrate in the first position and the spotting member engaging the substrate in the second position for delivering liquid, the spotting member advancing from the first position to the second position at pre-determined, variable velocity, the spotting member velocity reduced when the spotting member approaches the second position from the first position.

- permitting the spotting member to engage the substrate for a pre-determined period of time to allow the liquid to form a spot on the substrate suitable for microarray operation.

39. The method of claim 38, wherein the spot is about 200 micrometres or less.

40. The method of claim 38, further comprising forming a plurality of spots having a diameter of about 200 micrometres or less wherein the distances between spots are 400 micrometres or less.

41. The method of claim 40, capable of forming more than 9200 spots per square centimetre.

42. The method of any of claims 38 to 41, wherein the liquid delivered onto the solid substrate comprises DNA.

43. A method of drawing liquid from a well into a spotting member for a microarray operation, comprising:

- advancing the spotting member from a first position to a second position, the spotting member spaced apart from the well in the first position and the spotting member proximate to the bottom of the well for drawing liquid in the second position, the spotting member advancing from the first position to the second position at pre-determined, variable velocity, the spotting member velocity reduced when the spotting member approaches the second position from the first position.

- permitting the spotting member to remain proximate to the bottom of the well for a pre-determined period of time to draw the liquid into the spotting member.